Peripheral Noradrenaline Guideline

Introduction

Patients may be admitted with mild septic shock, requiring the initiation of vasopressors. In these patients, a central venous catheter (CVC) is often deemed too invasive and the patient is commenced on peripheral vasopressors such as metaraminol, however noradrenaline is also an acceptable alternative. The decision to start peripheral noradrenaline should be made by doctor a ST3 (or equivalent level) and above.

This guideline covers the use of peripheral noradrenaline in the following areas:

1. Critical Care Units (106B and 201)
2. Surgical High Dependency Unit (217)
3. Emergency Department Resus Room

Rationale

Evidence: The majority of studies in septic shock have looked at noradrenaline rather than metaraminol.

Cost: Metaraminol is considerably more expensive than noradrenaline.

Safety: A recent systematic review of 7 studies of peripheral vasopressors, spanning 1382 patients has shown an extravasation rate of 3.4% (CI 2.5-4.7%) and no reported episodes of tissue necrosis or limb ischaemia[1]. This study covered the use of any peripheral vasopressor 51% used noradrenaline and 5.4% used metaraminol.

National Guidance: There is recent national guidance from the Intensive Care Society supporting the use of peripheral noradrenaline[2]

Administration (based on ICS Guidance[2])

- Peripheral noradrenaline should only be administered at a concentration of **16micrograms/mL**
- To do this:
  - Remove 4mL from a 250mL bag of 0.9% sodium chloride or 5% dextrose
  - Add 4mg of noradrenaline (1 x 4mL vial of noradrenaline 1mg/mL) and mix by inverting and agitating the bag several times
  - Add yellow infusion label to the bag
- Noradrenaline should be administered via a dedicated peripheral venous cannula (PVC) or Midline. There should be no other drugs running via a Y-connection and the cannula should only be used for noradrenaline.
- Ideally, the cannula should be:
  - 20G (pink) or larger proximal to the wrist
  - In the awake/moving patient, consider avoiding points of flexion to avoid interruption of the infusion
- Avoid sites of repeated recent venepuncture

- Before administration, the cannula should be flushed with 10mL 0.9% Sodium Chloride to check for pain, swelling, excessive resistance or blanching.
- The starting rate is 0.05micrograms/kg/min and should be titrated to effect, in the same way as central noradrenaline, by increasing or decreasing rate by 1 to 5mL/hr as needed to achieve target.
    - Noradrenaline has its effect quickly, if the target has not been achieved 5 minutes after a rate change then a further rate adjustment should be made
    - If approaching the “maximum” rate, then consideration should be given to siting a CVC and converting to central noradrenaline
    - The max rate can be exceeded while a CVC is being sited, or if a patient is felt to not to be a candidate for invasive access and central noradrenaline
- Consider having a backup PVC available in case of initial PVC failure.

Weight (kg)	Start Rate mL/hr (0.05micrograms/kg/min)	Max Rate mL/hr (0.15micrograms/kg/min)
40	7.5	22.5
50	9.4	28.1
60	11.3	33.8
70	13.1	39.4
80	15.0	45.0
90	16.9	50.6
100	18.8	56.3
110	20.6	61.9

Monitoring

- Blood pressure should be monitored either using an invasive arterial line or a non-invasive blood pressure (NIBP) cuff.
    - If using NIBP then set to check BP every 5 minutes until target blood pressure achieved
    - Once achieved, the cycle time can be increased to every 15 minutes
    - Avoid placing NIBP on the same limb as the infusion to prevent interruption of drug delivery
- Care needs to be taken to ensure any extravasation is identified quickly to prevent extravasation injury and interruption of drug delivery
    - Nursing staff should document every 15 minutes for the first hour:
        - Phlebitis
        - Swelling
        - Leakage
    - If no evidence of extravasation is identified then the frequency of recording can reduce to hourly while the infusion is running
    - If there is evidence of extravasation or high-pressure alarms from the syringe pump, then escalate to medical staff immediately.

End of Infusion

- Once the peripheral infusion is no longer required (either due to discontinuation of vasopressors or transition to central route), the cannula should either be flushed or removed immediately to prevent inadvertent bolus of noradrenaline.
- Flushing should be with 10mL 0.9% sodium chloride using a syringe pump at the starting rate from the table above for that patient to prevent cardiovascular instability.

Management of Extravasation Injury[2]

1) Stop the infusion immediately and disconnect the line from the PVC.
2) Inform medical staff and identify an alternate site for vasopressor infusion.
3) Attempt to aspirate 3-5mL from the PVC if able.
4) Remove the cannula and apply a dressing to the removal site.
5) Mark the extravasation area if possible, in order to allow monitoring of any developing injury.
6) Elevate the affected limb if able to do so to reduce swelling.
7) Consider application of a topical vasodilator agent to encourage local blood flow.
8) Administer analgesia if required.
9) Refer to Plastic Surgery if concerned.
10) Document the incident in ICCA/Trak and report via DATIX

References

1) Tian DH, Smyth C, Keijzers G, et al. Safety of peripheral administration of vasopressor medications: A systematic review. EMA - Emergency Medicine Australasia. 2020;32(2):220-227. doi:10.1111/1742-6723.13406
2) The Intensive Care Society. Guidance For: The Use of Vasopressor Agents by Peripheral Intravenous Infusion in Adult Critical Care Patients (V1.1). Accessed August 26, 2023. https://ics.ac.uk/asset/3B607648%2D9292%2D4EC7%2DB913D5FCCA6F7D55/